

What is claimed is:

1. A process for controlling operations in a cell for producing aluminum by electrolysis of alumina wherein said cell comprises a chamber containing a molten electrolyte comprising cryolite and alumina, said electrolyte being at least partially covered by a solid crust, said process comprising:

- (a) establishing a standard rate of addition of aluminum fluoride to the electrolyte;
- (b) sensing infrared radiation on the outer surface of the chamber with an infrared sensor to determine an actual temperature; and
- (c) when the actual temperature is greater than the target temperature, inspecting the crust for a crust hole and repairing the crust hole.

2. The process of claim 1 further comprising repeating steps (b) and (c).

3. The process of claim 1 comprising:

- (d) varying an actual rate of addition of aluminum fluoride to the electrolyte in response to the actual temperature, in accordance with one of the following steps:

- (1) increasing the actual rate of aluminum fluoride addition above the standard rate when the actual temperature is greater than the target temperature;

(2) reducing the actual rate below the standard rate when the actual temperature is less than the target temperature; or

(3) adding the aluminum fluoride to the electrolyte at about the standard rate when the actual temperature is about equal to the target temperature.

4. The process of claim 3 comprising performing step (d)(1) when said actual temperature is greater than said target temperature by more than a preselected limit.

5. The process of claim 3 comprising performing step (d)(1) or step (d)(2) when said actual temperature deviates from said target temperature by more than a preselected limit.

6. The process of claim 1 wherein repairing said crust hole comprises covering said crust hole with solid particles.

7. The process of claim 1 further comprising passing an electric current between an anode and a cathode in said cell thereby to produce aluminum.

8. The process of claim 1 wherein repairing said crust hole comprises covering it with a receptacle containing solid particles selected from the group consisting of alumina, aluminum fluoride, cryolite, and mixture thereof.

9. A process for controlling operations in a plurality of electrolytic cells as described in claim 1, comprising:

- (d) performing steps (a), (b), and (c) in each of the cells;
- (e) transmitting a thermal image from the infrared sensor to a data processor to estimate the actual temperature of the outer surface of the chamber of each cell; and
- (f) performing step (d) on any of the cells in which the actual temperature deviates from the target temperature by more than a preselected limit.

10. The process of claim 9 further comprising passing an electric current between an anode and a cathode in each said cells, thereby to produce aluminum in each said cells.

11. A process for controlling operations in a cell for producing aluminum by electrolysis of alumina wherein said cell comprises a chamber containing a molten electrolyte comprising cryolite and alumina, said electrolyte being at least partially covered by a solid crust, said process comprising:

- (a) establishing a standard rate of addition of aluminum fluoride to the electrolyte;
- (b) establishing a target temperature for an outer surface of the chamber;
- (c) sensing infrared radiation on the outer surface of the chamber with an infrared sensor to determine an actual temperature; and
- (d) varying an actual rate of addition of aluminum fluoride to the electrolyte in response to the actual temperature measured in step (c), by increasing the actual rate of aluminum fluoride addition above the standard rate when the actual temperature is greater than the target temperature and by reducing the actual rate below the standard rate when the actual temperature is less than the target temperature.

12. The process of claim 11 comprising adding said aluminum fluoride to said electrolyte at about said standard rate when said actual temperature is about equal to said target temperature.

13. The process of claim 11 further comprising passing an electric current between our anode and a cathode in said cell, thereby to produce aluminum.